SECTION 3 - SIGN STRUCTURE AND HOUSING

OUSING REQUIREMENTS

8.3.1.1.1 The housing shall include, but not be limited to, the following:

Doors	Ventilation
Latches/Handles	Gasketing
Hinges and Door Catches	Cage Supports and Mounting for PMMs and CMS Equipment

8.3.1.2 Housing Construction

8.3.1.2.1 The CMS housing shall be constructed to present a clean, neat appearance.

8.3.1.2.2 The CMS housing shall be fabricated from 3.18mm (0.125-inch) (minimum) thick 5052-H32 aluminum alloy and shall be designed to withstand 33 pounds (14.98kg) per square foot as specified in the latest AASHTO publication entitled "Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

8.3.1.2.3 The CMS housing shall have interior cage support frames to mount the PMMs. The cage support frame shall withstand or minimize vibration when the sign is mounted with any number of PMMs.

8.3.1.2.4 The doors, lifting eyes, gasket channels, dual tracks and all supports welded to the housing shall be fabricated of 3.18mm (0.125 inch) minimum thickness aluminum sheet. Bolted on supports shall be either the same material and thickness as the housing or 2.67mm (0.105 inch) minimum steel sheet.

8.3.1.2.5 The exterior Z-bar supports shall be fabricated of 6.35mm (0.250 inch) minimum thickness and the material shall be the same as the CMS housing.

8.3.1.2.6 Two dual tracks for screen assembly shall be the same material and thickness as the housing.

Model 500

8.3.1.2.7 A 152.4mm (6 inch) wide border made of the same material as the housing shall encompass the Pixel Matrix Module Section/Array and enclose any open areas around the section/array. The border shall be uniform and painted or treated according to specifications under this section.

Model 510 & 520

8.3.1.2.8 A 127mm (5-inch) wide border made of the same material as the housing shall encompass the Pixel Matrix Module Section/Array and enclose any open areas around the section/array. The border shall be uniform and painted or treated according to specifications under this section.

8.3.1.3 Welding

8.3.1.3.1 All exterior seams shall be continuously welded and each weld shall be uniform flow.

8.3.1.3.2 Welding on aluminum housings shall be done as follows:

8.3.1.3.2.1 On all exterior seams the gas tungsten arc (TIG) process using bare aluminum welding electrodes shall only be used.

8.3.1.3.2.2 On all interior seams the gas metal arc (MIG) or gas tungsten arc (TIG) process using bare aluminum welding electrodes shall be used.

8.3.1.3.3 The aluminum welding electrodes shall conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes. Procedures, welders and welding operators for welding on aluminum shall be qualified in accordance with the requirements of AWS B3.0, "Welding Procedure and Performance Qualification", and to the practices recommended in AWS C5.6.

8.3.1.3.4 The housing front door frames shall be double flanged out on all 4 sides and shall have strikers to hold tension on and form a firm seal between the door gasketing and the frame. The dimension between the door edge and the housing external surface when the door is closed and latched shall be 3.96mm ± 2.03mm (0.156 ± 0.08 inch).

8.3.1.3.5 Gasketing shall be provided on all door openings and shall be dust-tight. Gaskets shall be 6.35mm (0.25 inch) minimum thickness closed cell neoprene or silicone (BOYD R-10480 or equal) and shall be permanently bonded to the metal. If neoprene is used the mating surface of the gasketing shall be covered with a silicone lubricant to prevent sticking to the mating metal surface. A gasket top channel shall be provided to support the top gasket on the door (prevent gasket gravitational fatigue).

8.3.1.4 ACCESS DOOR AND PANELS

8.3.1.4.1 Front Access Door

Model 500

8.3.1.4.1.1 For the Model 500, the latching handle shall be on the left side of the front door with hinges on the right side. The latching handle shall be turned clockwise to an angle of 90 ± 5 degrees from the closed position in order to open the door. Latching the door closed from the open position shall be only performed in the counterclockwise direction.

Model 510 and 520

8.3.1.4.1.2 The Models 510 and 520 shall have double compartment doors. The latching|handle of the right door shall be on the left side with hinges on the right side. The latching handle shall be turned clockwise to an angle of 90 ± 5 degrees from the closed

position in order to open the door. Latching the door closed from the open position shall be only performed in the counterclockwise direction. The left door shall be a mirror image of the right door.

8.3.1.4.1.3 The latching handle shall have provision for padlocking in the closed position. Each handle shall be 19.05mm (0.75 inch) minimum diameter stainless steel with a minimum 0.5 inch shank. The padlocking attachment shall be placed at 101.6mm to 127.0mm (4.0 to 5.0 inches) minimum gripping length shall be provided.

8.3.1.4.1.4 The latching mechanism shall be a three-point draw roller type. The pushrods shall be turned edgewise at the outward supports and have a cross section of 6.35mm (0.25 inch) thick by 19.05mm (0.75 inch) wide, minimum.

8.3.1.4.1.5 Two-bolt per leave hinges shall be provided to bolt the CMS Housing (at the Control Compartment Section) to the doors. The housing shall have 4 hinges per door. Each hinge shall be 88.9mm (3.5 inches) minimum length and have a fixed pin. The pin ends shall be welded to the hinge and ground smooth. The pins and bolts shall be covered by the door edge and not accessible when the door is closed.

8.3.1.4.1.6 The door shall be provided with catches to hold the door open at both 90 and 180±10 degrees. The catch minimum diameter shall be either 9.53mm (0.375 inch) for plated steel or aluminum rods or 6.35mm (0.25 inch) for stainless steel. The catches shall be capable of holding the door open at 90 degrees in a 80-mph (128.82 km/h) wind acting at an angle perpendicular to the plane of the door.

8.3.1.4.2 Side Access Panels

8.3.1.4.2.1 There shall be two side access panels (top and bottom) for the Model 500 and one side access panel for the Model 510 on the CMS housing right end side adjacent to the Control Compartment. The panels shall be detailed as per Appendix Detail. The panels shall have louvered vents as specified under these specifications.

8.3.1.5 The CMS housing shall be provided with 2 lifting eyes Models 500 and 510, and 1 lifting eye Model 520 to be used when placing the housing on the sign structure. The lifting eyes shall be located where required. Each eye shall have a minimum diameter of 25.4mm (1.00 inch). The fully assembled sign shall have sufficient structural strength to be lifted and moved by either lifting eye, or both lifting eyes, without damage or permanent deformation to any part of the sign. A label shall be attached near each lifting eye reading, "Lift Vertically to Prevent Damage".

8.3.2 SURFACE TREATMENT

8.3.2.1 The Contractor shall have the option of Surface Treatment and Painting described herein or Anodizing:

8.3.2.2 Alternative surface treatment and painting methods must equal or exceed those specified and be approved by CALTRANS Division of New Technology & Research -Chemical Branch.

8.3.2.3 Anodizing

8.3.2.3.1 An anodic coating shall be applied to the aluminum surface after the surface has been cleaned and etched. The cleaning and etching procedure shall be to immerse in inhibited alkaline cleaner at 71° C for 5 minutes (Oakite 61A, Diversey 909 or equivalent in mix of 6 to 8 ounces per gallon to distilled water). Rinse in cold water. Etch in a sodium solution at 66° C for 5 minutes (0.5 ounce sodium fluoride plus 5 ounces of sodium hydroxide mix per gallon to distilled water). Rinse in cold water. Desmut in a 50% by volume nitric acid solution at 20° C for 2 minutes. Rinse in cold water.

8.3.2.3.2 The anodic coating shall conform to MIL-A-8625C (Anodic coatings for Aluminum and Aluminum Alloys) for Architectural Class II A34 Coating with flat black dye required on the CMS front surface. The black surface coating shall have a design life of a minimum of 10 years.

8.3.2.3.3 The anodic coating shall be sealed in a 5% aqueous solution of nickel acetate (pH 5.0 to 6.5) for 15 minutes at 99° C.

8.3.2.3.4 Black anodic coating shall be applied to the 6-inch border on the entire front face of the CMS housing, screen assembly frames, the 60 PMM panels and front access door.All other surfaces shall be treated with clear anodic coating.

8.3.2.4 Surface Treatment for Painting

The CMS unit assemblies such as the PMM panels, front and side access doors, etc. shall be treated prior to painting. The treatment steps are as follows:

1. Surface treat aluminum in accordance with the provisions of ASTM D-1730, Type B, Method 6 or Method 7. Immediately prior to treatment, the aluminum surfaces shall be cleaned following the procedures in either ASTM D-1730, Type A, Method 3 or ASTM D-1730, Type B, Method1.

8.3.3 PAINTING

8.3.3.1 General

8.3.3.1.1 Vinyl Wash Primer shall conform to Section 91-2.07 "Pre-Treatment, Vinyl Wash Primer (State Specification 8010-31A-27)" of the STATE Standard Specifications (July 1995).

8.3.3.1.2 After applications of the primer all exposed area of primed surfaces shall receive a minimum of 2 finish coats of paint conforming to the requirements for White Tintable Finish Paint Waterborne, Formula PWB-86, Revised or exterior grade latex paint conforming to the following:

Property	Value	ASTM Designation

Pigment content,%	24 Max	D3723
Nonvolatile content Wt%	49 Min.	D2369
Viscosity, KU	75 Min. to 90 Max.	D 562
Fineness of grind Hegman	6 Min.	D1210
Drying time at 77° F 50% RH, 4 mil wet film		D1640
Set to touch, minutes	30 Max.	
Dry through, hours	1 Max.	

No visible color change in the finish coats shall occur when tested according to ASTM Designation: G 53 using FS 40 UV- B bulbs for a min. of 38 cycles. The cycle shall be 4 hours UV exposure at 60° C and 4 hours condensate exposure at 40° C. The vehicle shall consist of 100% acrylic latex with a minimum of necessary additives.

8.3.3.1.3 Individual batches/lots of paints will require testing by the Division of New Technology, Materials and Research to assure compliance with specification requirements prior to use unless otherwise approved by the engineer. 203.2mmX203.2mm (8"x8") sample panels coated according to the requirements of these specifications and the following shall be provided for testing and approval with 90 days of award of contract. Two sample panels shall be provided for each color of finish paint. Each color panel shall be the same type aluminum specified to receive that color finish. When more than one type aluminum is required 2 panels of each color on each type shall be submitted.

8.3.3.2 Application

8.3.3.2.1 Surfaces exposed to the atmosphere shall be painted the full number of applications. Any open seams which will retain moisture shall be caulked with a non-sag polyurethane material conforming to Federal Specifications TT-S-230 Type II or other approved material before the application of the finish coat.

8.3.3.2.2 After a complete Surface Treatment process, one coat of vinyl wash primer with one part acid and four parts resin shall be applied. One part of acid is to be slowly added with constant stirring to four parts by volume of the resin just before use. The mixed components must be used within 8 hours. Vinyl wash primer is formulated for spray application only and shall be applied to a dry film thickness of 0.3 to 0.5 mils.

8.3.3.2.3 After application of the vinyl wash primer all exposed surfaces shall receive a minimum of 2 finish coats of an exterior grade acrylic latex paint. The first finish coat shall be tinted by the manufacturer to provide a color to contrast with the final finish coat. The total dry film of the first finish coat shall be not less than 2 mils.

8.3.3.3 The second finish coat color shall match the following:

8.3.3.3.1 Federal Standard 595a No.37038 to be applied to the 6-inch border on the front face of the CMS housing including, screen assemblies Control Cabinet Door and the 60 Pixel

Matrix Module Panels.

8.3.3.3.2 Federal Standard 595a No.37769 to be applied to the CMS housing including Z-Bars.

8.3.3.3.3 The total dry film thickness of all applications of the second finish coat shall be not less than 2 mils or more than 4 mils.

8.3.3.3.4 The 2 finish coats shall be applied in 2 or more applications to a total dry film thickness of not less than 4 mils or more than 8 mils.

8.3.3.3.5 The total dry film thickness of all paint applications shall be not less than 4.3 mils or more than 8.5 mils.

8.3.3.3.6 A minimum drying time of 12 hours shall be allowed between finish coats.

8.3.4 VENTILATION

8.3.4.1 The CMS housing shall be provided with the necessary louvered vents on both sides of the housing and below the housing to provide sufficient ventilation as described below.

8.3.4.2 There shall be no active ventilation such as electric fans or other devices in the CMS housing except in the CMS Control Compartment.

8.3.4.3 The CMS Control Compartment shall have a ventilation system including intake, exhaust, filtration, fan assembly and environmental control. A louvered vent of 0.25 inches in depth maximum shall be provided and positioned near the bottom on the lower panel of the CMS Sign Housing rightside. A removable and reusable filter filting in a fan mounting shell shall cover the vents and shall be held in place with bottom and side brackets and a spring-loaded top clamp.

8.3.4.3.1 The intake (including filter) and exhaust areas shall pass a minimum of 60 cubic feet of air per minute.

8.3.4.3.2 The fan assembly shall have ball or roller bearings and a capacity of at least 100 cubic feet of free air delivery per minute.

8.3.4.3.3 The fan assembly shall be a thermostatically controlled device adjustable to turn ON between 33° C and 65° C with a differential of not more than 6° C between automatic turn ON and OFF. Thermostat indication shall be marked in 10° C increments. Manual adjustment shall be provided.

8.3.4.3.4 The filter material shall be a McMaster-Carr Permanent Washable Air FilterNo. 2069K12 or equal.

8.3.4.3.5 The fan assembly shall be mounted on the CMS Control Compartment lower right side and exhaust into the Pixel Matrix Module Section.

8.3.5 SCREEN ASSEMBLY

8.3.5.1 The screen assembly shall consist of 6 panels for the Model 500, 4 panels for the Model 510 and 2 panels for the Model 520, where each panel is composed of a solar screening material and frame (each panel assembled into a frame).

8.3.5.1.1 The solar screening material or solar screen shall be a KSI Shading Systems' Type KSI 17 with a profile angle at 20 degrees or equal.

8.3.5.1.2 The framing for the panel shall be made from 6063-T5 extruded aluminum alloy. The solar screen shall be anchored under tension in the frame. The framing shall be designed to receive continuous vinyl strips in each side frame and a continuous stainless steel lacer wire in each horizontal frame, all properly assembled to insure screen tautness. Proper tension shall be provided the solar screen in its frame so as to maintain the tilt of the shading louvers. Solar screen material shall be anchored within its frame so as not to be bent, crimped or mutilated in any manner.

8.3.5.1.3 The size and type of frames to be used shall be designed and fabricated to withstand damages by winds up to 80-mph (128.82km/h).

8.3.5.2 Each adjacent panel shall be alternately mounted into one of two dual tracks attached to the front face of the CMS and located above and below the Pixel Matrix Module Section. There shall be a series of latches to lock the panels into a fixed position with adjacent side frames overlapping in order to minimize the blockage of lamps.

8.3.5.2.1 Each panel shall be provided with dampening material to reduce vibration between the overlapping side frames of adjacent panels.

8.3.5.2.2 The latches shall prevent the sections of screen or panels from being damaged by winds up to 80 mph (128.82km/h).

8.3.5.2.3 The latches shall be operated using only common hand tools (i.e. screwdriver) and shall be made of aluminum or stainless steel material.

8.3.5.2.4 The two dual tracks for the screen assembly shall not be open on the left end side of the CMS as viewed from the front face. The top and bottom tracks shall each be enclosed by an end cap on the left side. The end cap shall be mounted to the housing by a hex bolt.

8.3.5.3 After fabrication, each screen assembly section frame shall be treated and painted as specified under this section of these specifications.